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Household Hazardous Wastes: *Feasibility of Operating a Collection and Disposal Assistance Program*

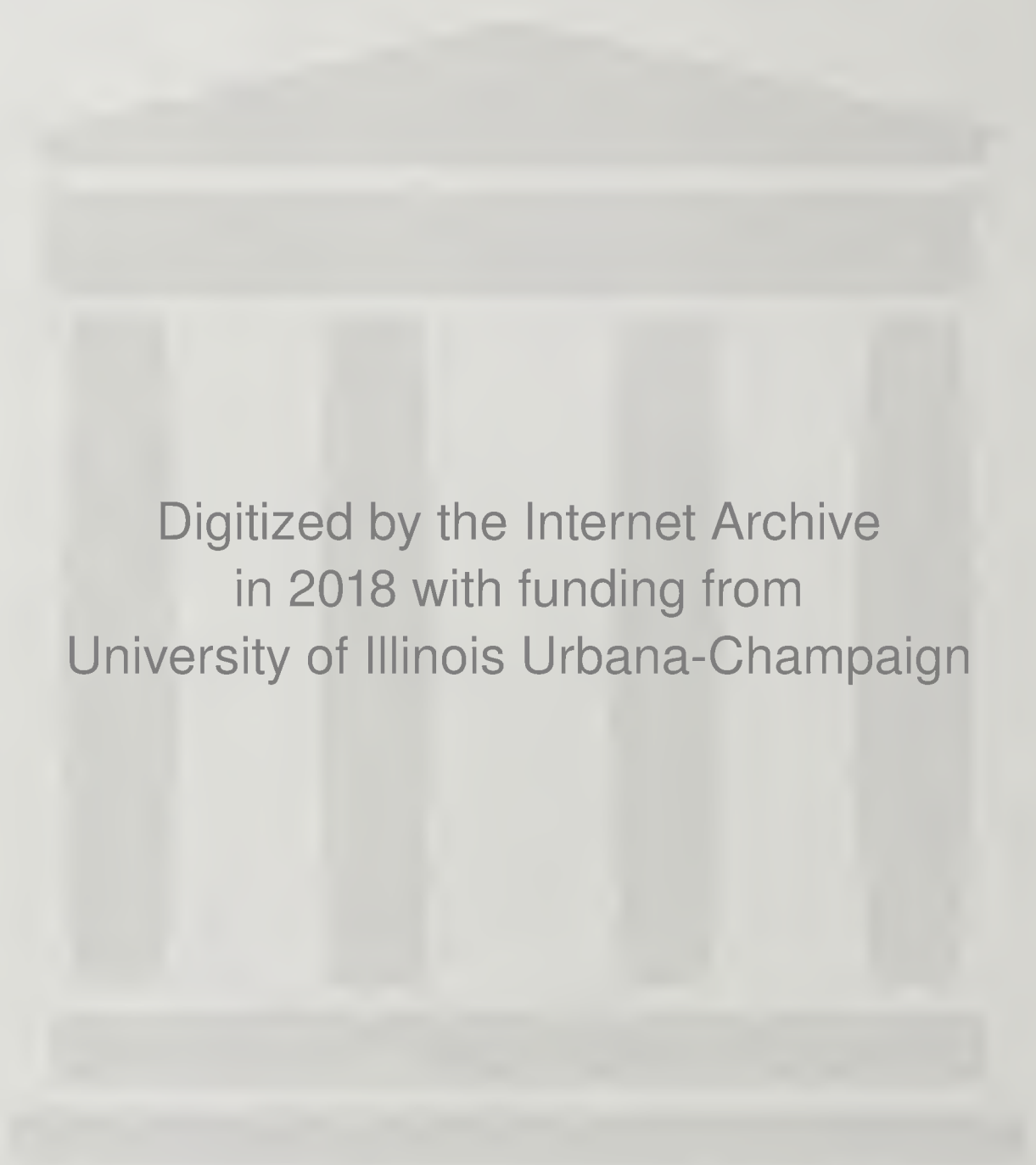


HOUSEHOLD HAZARDOUS WASTES:
FEASIBILITY OF OPERATING
A COLLECTION AND
DISPOSAL ASSISTANCE
PROGRAM

Illinois Environmental Protection Agency

March, 1989





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Household Hazardous Wastes: Feasibility of Operating a Collection and Disposal Assistance Program

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EXECUTIVE SUMMARY

Environmentally appropriate disposal of household hazardous wastes is not practically available to individual consumers. Research and pilot projects conducted during 1988 by the Illinois Environmental Protection Agency indicate that collection and disposal on a community or regional basis can be safely and efficiently conducted using the pilot projects as a model. Two other major findings of this effort are that appropriate disposal is relatively expensive and that participation rates of only one to two percent of targeted households may be expected.

The cost of disposing of household wastes which have hazardous or toxic characteristics in safe and environmentally appropriate ways may be several hundred times the original cost of the material when disposal is attempted by the individual consumer. Economies of scale can be realized by collecting such wastes from large groups of people before arranging disposal. Even so, collection and disposal costs often equal the original purchase price of the discarded product.

Nevertheless, the present and potential public health and environmental problems resulting from inappropriate disposal of such wastes are of high concern. Government at the local, state and federal levels has funded many collection and disposal projects across the nation during the last ten years. While such collections have usually been free, participation has rarely exceeded one percent of collection area households. Participation in the IEPA pilot projects ranged from 1.1% to 1.7%. This is in contrast to estimates that twenty percent of households dispose of these wastes inappropriately every year.

Increased publicity was only marginally effective during these pilot projects. Additional research on effective and efficient communication strategies appears warranted. As the overall premise that much more recycling is necessary becomes an accepted part of daily life, an awareness of disposal safety should become easier to effectively promote.

Consumer education to minimize household hazardous waste generation is the longer term solution. Yet consumers are not always conscientious in their current purchasing and use habits, or they have a stockpile of such waste left over from less enlightened times. This report recommends that the Agency expand its pilot projects to twenty-one over the next three years to service more of the State and for the purpose of researching strategies for more efficient collections and effective communication.

INTRODUCTION

This report is mandated by Section 22.19 of the Illinois Environmental Protection Act. The General Assembly enacted this requirement in 1988 because it recognized that a bottleneck exists when consumers try to find environmentally appropriate disposal of unwanted hazardous or toxic household products. Specifically, the Agency was charged with determining the feasibility of operating a collection and disposal assistance program for household hazardous wastes.

Household hazardous waste refers to specific waste products disposed by consumers which were originally intended for household uses. These wastes exhibit hazardous or toxic characteristics that would make them subject to regulation as hazardous waste were they not of household origin. The Resource Conservation and Recovery Act is the principal federal legislation controlling hazardous waste. It specifically exempts household hazardous waste from regulation. Examples of such wastes are: pesticides, drain cleaners, paint thinners, solvents, oil based paints, aged or dirty fuels, used motor oils, battery acid, many aerosol products, and other materials which are flammable, reactive, corrosive or toxic.

The following discussions outline the problem and its magnitude. An overview of the regulatory status of such waste and collection/disposal programs is then presented. Next is a description of the pilot projects conducted by the Agency. The results of the projects are discussed along with those of a survey conducted among project participants. These are then synthesized into findings and recommendations.

THE PROBLEM

A benefit of the continuing and rapid advancements in science and technology in the latter half of this century has been the application of this knowledge in the development of improved consumer products that are labor saving and enhance the quality of everyday life. Accompanying the convenience of a portion of these products are certain physical and chemical properties that make them a potential hazard to safety and health. In household products, such hazards are usually avoidable by easily adopted safe handling and usage habits. These are usually emphasized in warning labels printed on the product containers. Nevertheless, accidents still occur which result in exposures causing many injuries each year.

No one doubts that the aggregate benefits of such products in general offset the hazards they pose. However, efforts to reduce the incidence of injuries and yet maintain the benefits and convenience of such products should continue. Too many accidental injuries occur which are potentially avoidable. Another aspect of this issue is the safe disposal of such products from households when they are no longer wanted. Currently, disposal of household "hazardous" wastes are unregulated. A majority of consumer products are safe for disposal by conventional means, i.e., down a sanitary sewer or in the household garbage which is eventually landfilled. However, some products present serious hazards to waste handlers or are potentially damaging to the waste collection system. Still others present toxic hazards which have the potential to eventually pollute surface and groundwaters because they are not adequately ameliorated by the disposal systems currently used for the majority of household wastes.

The cumulative impacts of hazardous or toxic household wastes has been alleged to have caused or significantly contributed to groundwater and surface water pollution at several sites in Illinois (Quincy Municipal Landfill #3, Danville H & L Landfill #1, etc.). Additionally, untraceable upsets have been experienced at sewage treatment plants where disposal of toxic household wastes were suspected as a cause. Potentially explosive vapors and instances of objectionable odors are an even more common problem which can be caused by inappropriate disposal of hazardous household wastes.

Guidance for the general public on proper ways to dispose of potentially hazardous consumer products is very hard to come by and often is not very specific. Product labels, if they even address disposal, usually make general reference to assuring disposal is in compliance with local, state, and national regulations. Sometimes labels note a potential toxicity to fish with a general admonition to keep the product out of streams and other water bodies. Aside from alerting a householder that precautions should be considered for product disposal such labelling affords little specific direction on appropriate options or even the specific hazards posed. Therefore, most householders lack knowledge to make appropriate disposal decisions. Obtaining assistance is not easy. There are no generally available reference books addressing such questions which are intelligible to the layman. Further, local expertise is usually lacking. Regulators at the state and federal level are not specifically tasked with providing such information. This compounds the problem of a householder trying to locate someone with the necessary expertise. Even if a knowledgeable source of disposal advice is found, certain products can only be appropriately disposed by methods not economically priced or geographically located to encourage consumer participation.

The magnitude of this problem is illustrated by results of a survey performed in 1987 by the Hazardous Waste Research Center of the Illinois Department of Energy and Natural Resources. Household surveys in the urban areas of Champaign, Urbana, and Decatur together with farm family surveys in rural Champaign County, Illinois indicate that approximately 70,840 containers of household hazardous waste are disposed of annually in these areas which aggregately represent 74,637 households.

In comparison, average solid waste generation rates were: 4.7 pounds per person per day for non-urban counties and 5.5 pounds per person per day for urban counties. These statistics were from a report titled "Available Disposal Capacity for Solid Waste in Illinois - Second Annual Report" published by the Illinois Environmental Protection Agency in October 1988. Assuming 600 pounds per cubic yard and 2.5 persons per household, the population represented in the DENR study area generates approximately 622,127 cubic yards of solid waste per year. Of this, that study indicates that between 137 and 290 cubic yards were household hazardous wastes

This means that between 0.022 percent and 0.047 percent of total landfilled waste are unregulated household hazardous waste. Expressed in other terms, these statistics indicate that hazardous constituent concentrations could be as high as 220 to 470 parts per million of the aggregate waste. These are relatively high levels for even moderately toxic substances whose safe drinking water concentrations are measured in the low parts per billion (10,000 times lower).

Currently available evidence indicates that even well designed general refuse landfills can eventually leak contaminants to underlying groundwaters. Furthermore, dilution in groundwater is slow (measured in years) compared to surface waters (hours). Since about 5.5 million people in Illinois rely on groundwater for their drinking water, measures should be taken to prevent contamination. Based on the evidence presented above, it is apparent that one such measure would be to reduce the amounts of household hazardous wastes disposed of as general refuse.

This conclusion is neither new nor uniquely ours. As discussed above, the principal problem is that an effective way for individuals to implement a remedy is lacking. There are both economic and technical obstacles which result primarily from the heterogenous nature of household hazardous wastes. The many waste streams (types of HHW) must be appropriately identified, segregated, packaged, documented, and shipped to an appropriate disposer of each waste type. Disposal itself is often energy intensive which contributes to its high cost. The federal government's cradle-to-grave tracking system which was developed for industrial wastes, also results in a time consuming paperwork handling burden which becomes part of the final disposal cost. Minimization of these transfer expenses can be partially realized through economies of scale.

Usually, government bodies have organized and/or funded household hazardous waste collection and disposal programs. Most often these efforts take the form of one-time collection projects (one or two days) consisting of a central collection and packaging location in a community. The State of Minnesota is also experimenting with continuous permanent collection sites open one day per week by appointment.

Car wax, polish

Petroleum distillates

Irritant to skin, eyes, nose, lungs; entry into lungs may cause fatal pulmonary edema.

Motor oil/gasoline

Petroleum hydrocarbons (benzene)

Highly flammable; irritant to skin, eyes, nose, throat, lungs; benzene has been linked to leukemia.

Lead

Damage to digestive, genitourinary, neuro-muscular and central nervous system; anemia and brain damage. Absorbed through the skin.

Herbicides

(2,4-D; 2,4,5-T; 2,4,5-TP (Silver)); * MCPA, MCPB

Chlorinated Phenoxys

Deadly and mutagenic; irritation to skin, eyes, throat, toxic to central nervous system.

Pesticides

(Aldicarb, * Oxamyl Carbofuran, Methyomyl, Sactran, Propoxur, Carbaryl (Sevin)

Carbamates

Interfere with human nervous system.

Pesticides

(Endrin, * Aldrin, * Dieldrin, * Toxaphene, * Lindane, Hexachloride, DDT, * Heptachlor, * Chlordane, * Mirex, * Methoxychlor)

Chlorinated hydrocarbons

Very slow biodegradation; accumulation in food chain and in fatty tissue; attack nervous system; suspected carcinogens and mutagens.

Pesticides

(Phorate, Mevinphos, * Demeton, * Disulfoton, Parathion, * Diazinon, Trichlorfon, Ronnel, Azinphosmethyl)

Organophosphorus

Poison by interfering with the nervous system; can be toxic; biodegradable, but not much is known about the breakdown products.

Notes:

1. The potential health hazards listed in this table are symptoms of acute poisoning and may be experienced as a result of high exposure or direct ingestion.
2. This table has been reviewed for accuracy by the Illinois EPA Office of Chemical Safety.
3. In case of accidental poisoning contact:
Central and Southern Illinois Regional Poison Information
and Treatment Center at St. John's Hospital in Springfield
1-800-252-2022.



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HAZARDS OF HOUSEHOLD PRODUCTS

Product Type	Possible Ingredients	Potential Hazards
Air fresheners and deodorizers	Formaldehyde	Toxic, suspected carcinogen, irritant to eyes, nose, throat and skin may cause nausea, headaches, nose bleeds, dizziness, memory loss and shortness of breath
Bleach	Sodium hypochlorite	Corrosive, irritates or burns skin, eyes, respiratory tract, may cause lung irritation or vomiting and coma if ingested, contact with other chemicals may cause chlorine fumes
Disinfectants	Sodium hypochlorite	Corrosive, irritates or burns skin, eyes, may cause lung irritation, or vomiting and coma if ingested
	Phenols	Flammable, very toxic, respiratory, circulatory or cardiac damage
	Ammonia	Vapor irritating to eyes, respiratory tract and skin, possible chronic irritation
Drain cleaner	Sodium or potassium hydroxide (lye)	Caustic; irritant; burns to skin; eyes, poisonous if swallowed due to severe tissue damage.
	Hydrochloric acid	Corrosive, irritant, will cause severe burns on contact, emits irritant vapor
	Trichloroethane	Irritant to nose and eyes, central nervous system depression, liver and kidney damage if ingested
Flea powder	Carbaryl	Very toxic; interferes with human nervous system, may cause skin, respiratory system, cardiovascular system damage
	Dichlorophene	Skin irritation; may damage liver, kidney, spleen and central nervous system.
	Chlordane and other chlorinated hydrocarbons	Very slow biodegradation, accumulates in food chain, may damage eyes, lungs, liver, kidneys and skin.
Floor cleaner/wax	Diethylene Glycol	Toxic, causes central nervous system depression and kidney, liver lesions
	Petroleum solvents	Highly flammable, irritant to skin, eyes, nose, throat, lungs
	Ammonia	Vapor irritation to eyes, respiratory tract and skin; possible chronic irritation
Furniture polish	Petroleum distillates or mineral spirits	Highly flammable; moderately toxic; irritant to skin, eyes, nose, throat, lungs; entry into lungs may cause severe irritation
Oven cleaner	Sodium or potassium hydroxide (lye)	Caustic, irritant, burns to skin; eyes; poisonous if swallowed due to severe tissue damage.
Paint thinner	Chlorinated aliphatic hydrocarbons	Slow decomposition, liver and kidney damage
	Esters	Toxicity varies with specific chemical; causes eye, nose and throat irritation and anesthesia
	Alcohols	Volatile and flammable, eye, nose and throat irritation.
	Chlorinated aromatic hydrocarbons	Flammable; toxic; accumulate in food chain
	Ketones	Flammable, toxicity varies with specific chemical; may cause respiratory ailments.
Paints	Aromatic hydrocarbon thinners	Flammable, skin irritant, benzene is a carcinogen, possible liver and kidney damage
	Mineral spirits	Highly flammable, skin, eye, nose, throat, lung irritant; very high air concentrations may cause unconsciousness, death.
Spot removers	Perchloroethylene or trichloroethane	Slow decomposition, liver and kidney damage
	Ammonium hydroxide	Corrosive, vapor extremely irritable to skin, eyes and respiratory passages, ingestion causes tissue burns.
	Sodium hypochlorite	Corrosive, irritates skin, eyes, respiratory tract, may cause lung inflammation and skin burns
Toilet bowl cleaner	Sodium acid sulfate or oxalate or hydrochloric acid	Corrosive, burns from skin contact or inhalation; ingestion may be fatal.
	Chlorinated phenols	Flammable, very toxic; respiratory, circulatory or cardiac damage
Window cleaners	Diethylene glycol	Toxic; causes central nervous system depression and degenerative lesions in liver and kidneys
	Ammonia	Vapor irritating to eyes, respiratory tract and skin, possible chronic irritation
Wood stains/varnish	Mineral spirits, gasoline	Highly flammable; irritant to skin, eyes, nose, throat, lungs, entry into lungs may cause fatal lung irritation
	Methyl and ethyl alcohol	Flammable; damage to eyes, skin, central nervous system.
	Benzene	Flammable; carcinogen, accumulates in fat, bone marrow, liver tissues
	Lead	Damage to digestive, genitourinary, neuro-muscular and central nervous system; anemia and brain damage. Absorbed through the skin.
Antifreeze	Ethylene glycol	Very toxic; 3 ounces can be fatal to adults, damage to cardiovascular system, blood, skin, and kidneys
	Methanol	Moderately toxic, ingestion may cause coma, respiratory damage
Car wax, polish	Petroleum distillates	Irritant to skin, eyes, nose, lungs; entry into lungs may cause fatal pulmonary edema
Motor oil/gasoline	Petroleum hydrocarbons (benzene)	Highly flammable, irritant to skin, eyes, nose, throat, lungs, benzene has been linked to leukemia
	Lead	Damage to digestive, genitourinary, neuro-muscular and central nervous system, anemia and brain damage. Absorbed through the skin.
Herbicides (2,4-D, 2,4,5-T, 2,4,5-TP (Silvex),* MCPA, MCPB)	Chlorinated Phenoxys	Deadly and mutagenic; irritation to skin, eyes, throat, toxic to central nervous system
Pesticides (Aldocarb,* Oxamyl Carbofuran, Methyomyl, Sactran, Propoxur, Carbaryl (Sevin)	Carbamates	Interfere with human nervous system
Pesticides (Endrin,* Aldrin,* Dieldrin,* Toxaphene,* Lindane, Hexachloride, DDT,* Heptachlor,* Chlordane,* Mirex,* Methoxychlor)	Chlorinated hydrocarbons	Very slow biodegradation; accumulation in food chain and in fatty tissue; attack nervous system, suspected carcinogens and mutagens
Pesticides (Phorate, Mevinphos,* Demeton,* Diafotofen, Parathion,* Disonon, Trichlorfon, Ronnel, Asinphosmethyl)	Orgenophosphorus	Poison by interfering with the nervous system, can be toxic, biodegradable, but not much is known about the breakdown products

Notes:

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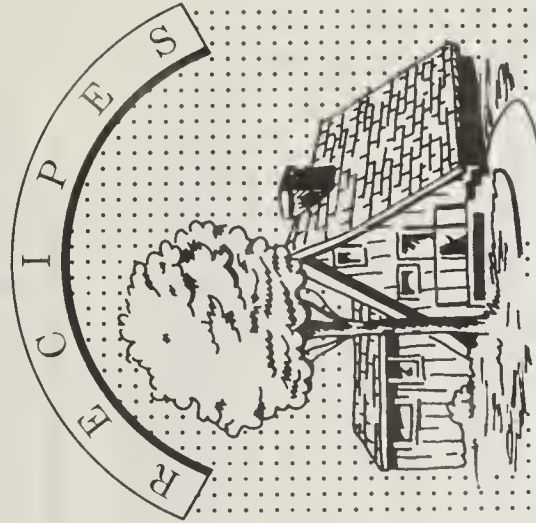
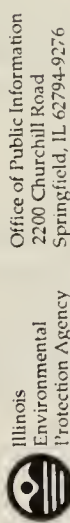
Alternatives and Precautions

Cleaning products	Precautions, solutions, or alternatives	Comments
Aerosols	Use pump-spray or other nonaerosol versions of cleaning and grooming products. For example, use liquid, paste, or powder oven cleaners; use cream, stick or roll-on deodorants.	Beyond the hazards of the active ingredients in aerosol sprays and the possibility of explosion, the propellants themselves may present a health hazard to the lungs when inhaled.
Air fresheners and deodorizers	Open a window, or use an exhaust fan — or do both. Sprinkle baking soda in odor producing areas or set vinegar out in an open dish. Place an open box of baking soda in the refrigerator to absorb food odors.	Air fresheners don't really "freshen" the air; they deaden our sense of smell or counteract one odor with another.
Carpet and rug shampoos	Mix 1/2 cup mild liquid dishwashing detergent with 1 pint boiling water; let cool. Whip the paste into a stiff foam using an electric mixer. Apply it to the carpet with a damp sponge. Rub gently. Work in 4 x 4 foot sections. Wipe off the suds with a clean cloth. To rinse, add 1 cup of white vinegar to 1 gallon of lukewarm water. Rinse each section and wipe the carpet dry as you go. Change the rinse solution frequently.	Clean the carpet on a dry, sunny day with the windows open to speed drying. Don't soak the carpet — it may mildew. Test any shampoo first on an inconspicuous area to prevent discoloration.
Ceramic tile cleaner	Measure 1/4 cup baking soda, 1/2 cup white vinegar, and 1 cup of ammonia into a bucket. Add 1 gallon of warm water and stir until the baking soda dissolves.	This solution also works well as a general multi-purpose cleaner.
Disinfectants and germicides	Wash items with soap and water, or with borax or sodium carbonate (washing soda) in water.	
Drain cleaners	Prevent clogging by covering drains with a screen to keep out grease, food scraps, hair. To loosen blockage, mix 1 cup each of baking soda and salt, and 1 cup of white vinegar and pour down drain. Wait 15 minutes. Flush drain thoroughly with boiling water. Use a rubber plunger or plumber's snake if drain is seriously clogged.	If you use a commercial drain opener that fails to work, you'll be left with a drain clogged with a highly caustic compound.
Floor wax and strippers	To polish linoleum and vinyl floors without commercial wax: Mix 1 part thick boiled starch with 1 part soap suds. Rub the mixture on the floor, and polish dry with a clean, soft dry cloth. To remove old wax: Pour a small amount of club soda on a section of floor. Scrub well; let soak for a few minutes, then wipe clean.	People who are sensitive to fumes and odors have been known to suffer headaches or other discomfort after exposure to fresh floor wax.
Furniture polish	Use olive oil, lemon oil, beeswax, or beeswax and olive oil. Or mix 2 teaspoons lemon oil and 1 pint mineral oil in a spray bottle.	
Mothballs	Place cedar chips or sprigs of dried tansy around clothes, or store clothes in cedar chest.	
Oven cleaner	Wipe away grease and spills after preparing each meal. Wipe away charred spills with a nonmetallic bristle brush. To remove baked-on grease and spills, scrub with a baking soda salt and water paste. Or sprinkle with dry baking soda; scrub with a damp cloth after 5 minutes. (Don't let baking soda touch wires or heating elements). Scour racks and burner inserts with steel wool.	Aerosol oven cleaners are among the worst contributors to indoor air pollution. People with asthma, chronic bronchitis, and other respiratory problems are particularly susceptible to fumes of strong oven cleaners. No matter how thoroughly you try to rinse these cleaners, a residue remains that begins to emit additional fumes the minute you heat the oven again.
Silver cleaner	Pour water into an aluminum or enameled pan with aluminum foil covering the bottom. Fill to depth of 2-3 inches (enough to cover silver with water). Add 1 teaspoon baking soda, 1 teaspoon salt, and heat until water boils. Add tarnished silver and boil 3 minutes. Remove silver, wash in soapy water, and polish dry. (Not for use on silver jewelry or flatware with hollow handles.)	
Spot removers	For butter, coffee, gravy, or chocolate stains: Sponge up or scrape off as much as possible, immediately. Dab with a cloth dampened with a solution of 1 teaspoon white vinegar and 1 quart cold water. For stains that have set, try a dab of full-strength white vinegar. Or put paper towels underneath to blot, and apply a solution of equal parts ammonia and water. (If an ammonia stain remains, blot it with a solution of table salt in water.)	Taking care of spots immediately, with nontoxic compounds avoids a trip to the dry cleaners. Commercial drycleaning agents such as perchloroethylene and tetrachloroethylene may cause light-headedness, dizziness, and other central nervous system symptoms.
Toilet-bowl cleaner	Pour 1/2 cup liquid chlorine bleach into toilet bowl. Let stand for at least then 30 minutes, scrub with a long-handled brush and flush.	
Window cleaner	Measure 3 tablespoons ammonia, 1 tablespoon white vinegar, and 3/4 cup water into a clean spray bottle, use a solution of 2 tablespoons vinegar and 1 quart water.	
Caution: Never mix products containing ammonia with chlorine bleach, toilet-bowl cleaners, rust removers, or oven cleaners. The combination releases pungent, poisonous gases.		
Home workshop and hobby products	Precautions, solutions, or alternatives	Comments
Paint oil-based	Use water-based paint whenever possible. Seal all paint cans with a tight fitting lid.	Ingredients in oil-based paint may cause flu-like symptoms when inhaled.
apray	Use nonaerosol paints	(See comments under aerosols)
Paint strippers, glue and adhesives, turpentine, varnish lacquers, auto-body repair compounds	Use outdoors or in a very large room with a steady current of dry (not humid) air. Ventilate well: Open all windows and the door, and use a large exhaust fan to blow fumes out. Wear a paper filter dust mask when grinding or sanding. Use a dust attachment on power tools. Clean up dust and filings with a vacuum cleaner, not a broom. Don't soak brushes in solvents. Clean them immediately, and soak them in plain water or soap and water. Always wear protective goggles, gloves, and a work apron. Separate the work area apart from the living space as much as possible.	Solvents used in furniture refinishing can cause headaches, drowsiness, blurred vision, impaired motor response, and chemical intoxication. Paint solvents are of particular concern to people with heart conditions and those who wear contact lenses because methanol and certain other solvent compounds can stress the heart, and contact lenses absorb strong vapors and hold them against the eye, causing irritation or eye damage.
Pest and weed control	<p>Spray plants with less toxic compounds. For example: Spray with a soap-and-water solution (3 tablespoons of soap per gallon of water) for aphids, mealybugs, mites, and whiteflies. Spray with pyrethrum, a product of a type of chrysanthemum, to control caterpillars, beetles, aphids, mites, leafhoppers, thrips, moths, and dozens of other fruit and vegetable pests.</p> <p>Introduce other predatory bugs, such as soldier bugs, ladybugs, damsel bugs, pirate bugs, spiders lacewings, and gall midges to control unwanted pests. Use bacterial pesticides, such as <i>Bacillus popilliae</i> for Japanese beetles and <i>B. thuringiensis</i> for many types of insect larvae.</p> <p>Interplant with pest repellent plants: marigolds coriander, thyme, yarrow, rue, and tansy. Indoors dispose of garbage to avoid attracting ants. Use flypaper and flyswatters. For household insect spray: grind or blend 1 garlic clove and 1 onion. Add 1 tablespoon cayenne pepper and 1 quart water. Mix well. Let steep 1 hour. Add 1 tablespoon liquid soap.</p> <p>To control fleas on dogs and cats: Bathe animals every 2 to 4 weeks with pet shampoos containing insect repellent herbs such as rosemary, rue, eucalyptus, and citronella. For termites, ask exterminator to use organophosphates, such as chlorpyrifos (Dursban T.C., by Dow).</p>	<p>All commercial chemical sprays can be toxic to people under certain circumstances. If you decide to use chemical pest-and-weed control products anyway, dispose of leftovers properly to lessen the impact on the air and water supply.</p> <p>Store all insecticides and herbicides under lock and key to prevent accidental poisoning in children.</p>

KNOW YOUR CHEMICALS

Alternatives and Precautions

Cleaning products	Precautions, solutions, or alternatives	Comments
Aerosols	Use pump-spray or other nonaerosol versions of cleaning and grooming products. For example, use liquid, paste, or powder oven cleaners; use cream, stick or roll-on deodorants.	Beyond the hazards of the active ingredients in aerosol sprays and the possibility of explosion, the propellants themselves may present a health hazard to the lungs when inhaled.
Air fresheners and deodorizers	Open a window, or use an exhaust fan — or do both. Sprinkle baking soda in odor producing areas or set vinegar out in an open dish. Place an open box of baking soda in the refrigerator to absorb food odors.	Air fresheners don't really "freshen" the air; they deaden our sense of smell or counteract one odor with another.
Carpet and rug shampoos	Mix 1/2 cup mild liquid dishwashing detergent with 1 pint boiling water; let cool. Whip the paste into a stiff foam using an electric mixer. Apply it to the carpet with a damp sponge. Rub gently. Work in 4 x 4 foot sections. Wipe off the suds with a clean cloth. To rinse, add 1 cup of white vinegar to 1 gallon of lukewarm water. Rinse each section and wipe the carpet dry as you go. Change the rinse solution frequently.	Clean the carpet on a dry, sunny day with the windows open to speed drying. Don't soak the carpet — it may mildew. Test any shampoo first on an inconspicuous area to prevent discoloration.
Ceramic tile cleaner	Measure 1/4 cup baking soda, 1/2 cup white vinegar, and 1 cup of ammonia into a bucket. Add 1 gallon of warm water and stir until the baking soda dissolves.	This solution also works well as a general multi-purpose cleaner.
Disinfectants and germicides	Wash items with soap and water, or with borax or sodium carbonate (washing soda) in water.	
Drain cleaners	Prevent clogging by covering drains with a screen to keep out grease, food scraps, hair. To loosen blockage, mix 1 cup each of baking soda and salt, and 1 cup of white vinegar and pour down drain. Wait 15 minutes. Flush drain thoroughly with boiling water. Use a rubber plunger or plumber's snake if drain is seriously clogged.	If you use a commercial drain opener that fails to work, you'll be left with a drain clogged with a highly caustic compound.
Floor wax and strippers	To polish linoleum and vinyl floors without commercial wax: Mix 1 part thick <u>boiled</u> starch with 1 part soap suds. Rub the mixture on the floor.	People who are sensitive to fumes and odors have been known to suffer headaches or other



for a Safer Home

The disposal of household hazardous waste is a growing problem in many Illinois households throughout the state. The Illinois Environmental Protection Agency defines hazardous waste as corrosive, ignitable, reactive or toxic. This definition pertains to products used in the kitchen, bathroom, garage, workshop, garden and also on the lawn.

This pamphlet deals with the precautions of household hazardous waste and the alternatives citizens can use to reduce or eliminate the use and disposal of this type of hazardous waste found in nearly every household.

AEROSOLS

Aerosol sprays are hazardous because of the active ingredients they contain and the possibility of explosion they present. The propellants may also be hazardous to the lungs when inhaled. Use pump-spray or other nonaerosol versions of cleaning and grooming products such as liquid, paste or powder oven cleaners and cream, stick or roll-on deodorants.

AIR FRESHENERS AND DEODORIZERS

Air fresheners do not really "freshen" the air but instead they deaden the sense of smell or counteract one odor with another. Open a window, use an exhaust fan or do both. Sprinkle baking soda in odor producing areas or set vinegar out in an open dish. Place an open box of baking soda in the refrigerator to absorb food odors.

CARPET AND RUG CLEANERS

Mix 1/2 cup mild liquid dishwashing detergent with 1 pint boiling water and let cool. With an electric mixer whip the paste into a stiff foam. Apply it to the carpet with a damp sponge and rub gently. Work into 4 x 4 sections. Wipe off the suds with a clean cloth. To rinse, add 1 cup of white vinegar to 1 gallon of lukewarm water. Rinse each section and wipe the carpet as you go. Change the

rinse solution frequently. Clean the carpet on a dry sunny day with the windows open to speed drying. Do not soak the carpet; it may mildew. Test any shampoo first on an inconspicuous area to insure that no discoloration will occur.

CERAMIC TILE CLEANERS

Pour 1/4 cup baking soda, 1/2 cup white vinegar and 1 cup ammonia into a bucket. Add 1 gallon warm water and stir until baking soda dissolves. This solution can also be used as a general multipurpose cleaner.

DISINFECTANTS AND GERMICIDES

Wash items in soap and water. Washing in Borax or sodium carbonate (washing soda) and water will also work.

DRAIN CLEANERS

If you use a commercial drain opener that fails to work, you will be left with a drain clogged with a highly caustic compound. Prevent clogging by covering drains with a screen to keep out grease, food scraps and hair. To loosen blockage, mix 1 cup each of baking soda and salt and 1 cup of white vinegar and pour down drain. Wait 15 minutes. Flush drain thoroughly with boiling water. Use a rubber plunger or plumber's snake if drain is seriously clogged.

FLOOR WAX STRIPPERS

People who are sensitive to fumes and odors have been known to suffer from headaches or other discomfort after being exposed to fresh floor wax. To polish linoleum and vinyl floors without commercial wax, mix 1 part thick boiled starch with 1 part soap suds. Rub the mixture on the floor and polish dry with a clean, soft, dry cloth. To remove old wax, pour a small amount of club soda on a section of the floor. Scrub well, let soak for a few minutes, then wipe clean.

FURNITURE POLISH

Use olive oil, lemon oil, beeswax or a mixture of beeswax and olive oil. A mixture of 2 teaspoons lemon oil and 1 pint mineral oil in a spray bottle will also work.

MOTHBALLS

Place cedar chips or sprigs of dried tansy around clothes or store clothes in cedar chest.

OVEN CLEANER

Aerosol oven cleaners are among the worst contributors to indoor air pollution. People with asthma, chronic bronchitis, and other respiratory problems are particularly susceptible to the fumes of strong oven cleaners. No matter how thoroughly you try to rinse these cleaners, a residue remains that emits additional fumes the minute you heat the oven again. Wipe away grease and spills after preparing each meal. Wipe away charred spills with a nonmetallic bristle brush. To remove baked-on grease and spills scrub with baking soda. Do not let the baking soda touch wires or heating elements. Scour racks and burner inserts with steel wool.

SILVER CLEANERS

Pour water into an aluminum or an enameled pan with aluminum foil covering the bottom. Fill with enough water to cover the silver (2-3 inches). Add 1 teaspoon baking soda and 1 teaspoon salt and boil for 3 minutes. Remove silver, wash in soapy water and polish dry. Do not use for silver jewelry or flatware with hollow handles.

SPOT REMOVERS

Taking care of spots immediately with nontoxic compounds avoids a trip to the dry cleaners. Commercial dry cleaning agents may cause light-headedness, dizziness and other central nervous system symptoms. For butter, coffee, gravy or chocolate stains, immediately sponge up or scrape

off as much of the stain as possible. Dab with a damp cloth of 1 teaspoon white vinegar and 1 quart cold water solution or put paper towels underneath the blot and apply a solution of equal parts ammonia and water. If an ammonia stain remains, blot it with a solution of table salt in water.

TOILET BOWL CLEANERS

Pour 1/2 cup liquid chlorine bleach into the toilet bowl. Let stand for at least 30 minutes. Scrub with long-handled brush and flush.

WINDOW CLEANERS

Measure 3 tablespoons ammonia, 1 tablespoon white vinegar and 3/4 cup water into a clean spray bottle. Use a solution of 2 tablespoons vinegar and 1 quart water.

CAUTION: NEVER MIX PRODUCTS CONTAINING AMMONIA WITH CHLORINE BLEACH, TOILET BOWL CLEANERS, RUST REMOVERS OR OVEN CLEANERS. THESE PRODUCTS WILL PRODUCE POISONOUS GASES WHEN COMBINED!

HOME WORKSHOP PRODUCTS

PAINT STRIPPERS, GLUES AND ADHESIVES, TURPENTINE, VARNISH, LACQUERS AND AUTO BODY REPAIR COMPOUNDS

Solvents used in furniture refinishing can cause headaches, drowsiness, blurred vision, impaired motor response and chemical intoxication. Paint solvents are of particular concern to people with heart conditions and to those who wear contact lenses. Methanol and certain other solvent compounds can stress the heart. Contact lenses absorb strong vapors holding contacts against the eyes causing irritation or eye damage.

Use these products outdoors or in a very large room with a steady current of dry, not humid, air. Ventilate well by opening all windows and doors.

Use a large exhaust fan to blow fumes out. Wear a paper filter dust mask when grinding or sanding. Use a dust attachment on power tools. Clean up dust and filings with a vacuum cleaner instead of a broom. Do not soak brushes in solvents. Clean them immediately and soak them in plain water or soap and water. Always wear protective goggles, gloves and a work apron. Separate the work area from the living space as much as possible.

LAWN PRODUCTS

All commercial chemical sprays can be toxic to people under certain circumstances. If you still decide to use chemical pest and weed control products, dispose of leftovers properly to lessen the impact on the air and water supply.

Spray plants with less toxic compounds. For example, spray with a soap and water solution of 3 tablespoons of soap per gallon of water for aphids, mealybugs, mites and whiteflies. Spray with pyrethrum, a product of a type of chrysanthemum, to control caterpillars, beetles, aphids, mites, leafhoppers, thrips, moths and dozens of other fruit and vegetable pests.

Store all insecticides and herbicides under lock and key to prevent accidental poisoning in children. Introduce other predatory bugs, such as soldier bugs, ladybugs, damsel bugs, pirate bugs, spiders, lacewings and gall midges to control unwanted pests. Use bacterial pesticides, such as *Bacillus popilliae* for Japanese beetles and *B. thuringiensis* for many types of insect larvae.

Interplant with pest repellent plants: marigolds, coriander, thyme, yarrow, rue and tansy. Indoors dispose of garbage to avoid attracting ants. Use flypaper and flyswatters. For household insect spray, grind or blend 1 garlic clove and 1 onion. Add 1 tablespoon cayenne pepper and 1 quart water. Mix well. Let steep 1 hour. Add 1 tablespoon liquid soap.

FLEAS

To control fleas on dogs and cats, bathe animals every two to four weeks with pet shampoos containing insect repellent herbs such as rosemary, rue, eucalyptus and citronella.

TERMITES

Ask exterminator to use organophosphates, such as chlorpyrifos (Dursban T.C., by Dow).

For more information please contact:

Illinois Environmental Protection Agency
Office of Public Information
2200 Churchill Road
P.O. Box 19276
Springfield, IL 62794-9276
217-782-5562

In case of accidental poisoning contact the poison center in one of the Illinois regions listed below.

For central and southern Illinois:

Central and Southern Regional
Poison Resource Center at St. John's Hospital
in Springfield.....1-800-252-2022

If calling from Sangamon county.....753-3330

For central and northern Illinois:

Regional Poison Resource Center
for Central and Northern Illinois
at Pekin Memorial Hospital
in Pekin.....1-800-322-5330

For Chicago and northeastern Illinois:

Chicago and Northeastern Illinois Regional
Poison Control Center at Rush Presbyterian -
St. Luke's Hospital in Chicago.....1-800-942-5969

*Information was provided and reviewed by the
IEPA Office of Chemical Safety.*

REGULATORY BACKGROUND

Federal legislation known as the Resource Conservation and Recovery Act (RCRA) became effective in 1980 and forms the basis of regulation of hazardous waste disposal. This law specifically exempts household hazardous wastes from regulation. It was intended that the focus of early efforts would be to control the high volume, high toxicity wastes generated by industry. To effectively accomplish this, voluminous and complex regulations were created specifying a cradle-to-grave tracking system, detailed recordkeeping requirements, and specifications for facility design and operation which are necessarily restrictive. Little flexibility is allowed in meeting many of these requirements. Compliance, therefore, results in relatively high costs for disposal of RCRA wastes compared to non-hazardous trash.

However, these same facilities that handle industrial wastes are those with the capability of adequately treating or disposing of household hazardous wastes. These facilities, though not required to, must from a practical standpoint keep as detailed records of non-RCRA wastes as they do of RCRA wastes in order to have proof that they remain in RCRA compliance. The result is that a household hazardous waste is at least as expensive to dispose of as a similar quantity of RCRA-regulated hazardous waste. Furthermore, industrial waste is often less costly on a unit basis because the administrative costs are spread over a substantial volume. Specific household hazardous wastes usually have a low or very low volume to spread such costs over. This is why a gallon of pesticide can be purchased by a consumer for \$30 at a hardware store and costs \$600 to dispose of. Since household hazardous wastes are excluded from RCRA regulation, their disposal does not result in a duty imposed on a household to expend funds for specific disposal. However, the result of overall RCRA regulation is that appropriate disposal of the most toxic household wastes is so expensive that such responsible behavior is discouraged.

Since these disincentives are partly a result of the scale of disposal, a common approach to encourage appropriate disposition of HHW is to organize community collections to aggregate wastes by type to increase the volume over which the overhead costs are apportioned. This can reduce disposal costs to around \$3 - \$5 per pound (\$30 to \$50 per gallon). While these economies are significant, the costs are still often higher than the original price of the products which became wastes. Some concerned citizens are willing to pay such costs, but many are reluctant, probably because historically garbage disposal has been either free or relatively cheap compared to the cost of products. Perceiving this, concerned government agencies have often underwritten the costs of collection and disposal. Such programs usually result in significant expenditures, which are often beyond the means of agency budgets unless specific funding sources are developed.

Recognizing the potential need for state involvement to nurture, encourage and perhaps provide funding support for such programs, the Illinois General Assembly acted in 1988 to provide legal and fiscal authorities. Amendments to the Solid Waste Management Act authorized the Illinois Environmental Protection Agency to conduct household waste collection and disposal programs (Ill. Rev. Stat., Ch. 111 1/2, par. 1022.15 (i)) using funds from the Solid Waste Management Fund.

Even so, certain institutional disincentives to promoting such programs remain. One is that the Illinois Environmental Protection Act currently defines any waste transfer station as a "Regional Pollution Control Facility" if it accepts wastes from or serves an area that exceeds or extends over the boundaries of any local general purpose unit of government. Household hazardous waste collections usually occur in such a manner that the collection site could be considered a waste transfer station. To capture the full economic efficiencies of a collection, the ability is needed to accept waste from as wide an area as practicable. This would often result in exceeding the boundaries of the most local general purpose unit of government. Moreover, turning householders away from a collection to avoid this legal status would be contrary to the basic purpose of this activity. The real problem is that "Regional Pollution Control Facilities" must receive siting approval by the county board or municipal governing body. This process takes at least 120 days by statutory requirement and can take significantly longer. A permit from the Illinois Environmental Protection Agency is also required for a "Regional Pollution Control Facility." Without relief for household hazardous waste collection programs from these specific statutory requirements, most collection projects would be subject to a considerable amount of red tape and delay which is inconsistent with their scope and would undoubtedly increase the costs of such projects. Alternatively, projects could be conducted without applying for siting and permitting approval by construing them not to be waste transfer stations. Whether this reasoning could withstand legal challenge is debatable.

A better solution would be to provide for specific recognition in the law that these projects have a special status which deserves a more expedited siting approval and/or permit authority. Of course, carte blanche exemption might invite abuses; but specific permit or siting conditions could be developed in law or regulation to assure that operations are conducted to safeguard the public health and the environment yet respond to applications in a timely manner that encourages private and public agency involvement in such endeavors.

A second legal limitation is section 7(f) of the Environmental Protection Act which prohibits the Environmental Protection Agency from imposing fees for services rendered. This limits the Agency's ability to directly conduct household hazardous waste collections on a cost-share basis with participants. It may be preferable to be able to collect a fee for two reasons. The first is to stretch the available government funds to conduct more collections. A second reason to charge for such collection is to impress upon participants that such disposal is costly and to encourage waste minimization. The ultimate solution to household hazardous waste disposal could be to convince consumers to shop wisely for products which don't become household hazardous waste and when hazardous products are unavoidable, to purchase in quantities sized to the intended immediate application so as to minimize or eliminate waste. This might be accomplished sooner if consumers realize that disposal of excess hazardous products is personally costly in that it won't be entirely underwritten by government.

The section 7(f) limitation can be overcome by having a local governmental entity impose and collect the fees (assuming they aren't similarly limited). However, it constrains the available options for administering projects and may result in bureaucratic inefficiencies which

do not contribute to the overall effectiveness of projects. A solution would be to specifically amend the Environmental Protection Act and the Solid Waste Management Act to provide for partial participant funding of these efforts.

IEPA PILOT PROJECTS

In the fall of 1987, Governor James R. Thompson requested that the Agency conduct several pilot projects to determine the feasibility of household hazardous waste collection and disposal with respect to the administrative, legal, and economic issues specific to Illinois. Due to state budgetary constraints, the Governor had vetoed a bill authorizing a state grant program for the purpose of conducting such projects statewide. However, he was supportive of the purpose of that legislation and wanted to move forward with preparatory studies aimed at effectively implementing such a program when the overall financial situation allowed.

Subsequently, the Agency determined that use of a limited amount of funds set aside for chemical emergency response (the Hazardous Waste Fund) would be appropriate since this use of these funds could, arguably prevent a future emergency. An expenditure target of \$150,000 was estimated to be reasonably capable of funding three pilot projects. Requests were received about this time from local groups representing the Quincy and Homewood areas for assistance with household hazardous waste collections. The Agency agreed to conduct pilot projects in those locations. Additionally, to provide a diversity among the projects by geographical location, population size and media market type, the Agency approached the City of Mt. Carmel which also agreed to participate.

Within the Agency, the Office of Chemical Safety was selected to conduct the projects because of its prior experience during 1986 - 1987 of conducting a statewide collection and disposal project of excess hazardous laboratory chemicals from over 700 high schools. Many of the lessons learned during that effort were directly transferable to the pilot projects. The Office of Chemical Safety staff also includes a number of chemists and industrial hygienists which comprise the Agency's emergency response and safety staff. Their contribution was valuable in designing the collection format to be as safe and efficient as possible.

The three pilot projects were designed to be somewhat different from each other in certain, non-safety related aspects. This was done to see what affect differing conditions would have on participation rates. One variable was the demographic setting of the project locations as summarized in Table 1.

Table 1
DEMOGRAPHIC DIVERSITY OF PROJECT LOCATIONS

<u>Location</u>	<u>Community Type</u>	<u>Target Population</u>
Homewood	Suburban/Metropolitan	50,000
Quincy	Urban/Agricultural	40,000
Mt. Carmel	Small Town/Agricultural	10,000

This table also shows that the target populations varied. Additionally, the media markets in which the projects were conducted varied significantly, determining both the willingness of certain media to publicize the event and the extent of coverage given. It was also initially anticipated that

the Agency might arrange for different contractors to perform the actual collection and disposal tasks at each location. With that in mind, the request for bid document produced to solicit competitive proposals from interested contractors, was designed to get cost breakdowns allowing for award of contracts by single or multiple locations.

The logistical requirements of obtaining local approvals as well as complying with state purchasing regulations, and other practical considerations in the procurement process necessitated a rather long lead time to plan and organize the projects. The initial decisions to proceed were made in January 1988. It would have been possible to plan and conduct the collections by July and August, but a determination was made that the safety of participants at the collection as well as workers would be best protected when outdoor temperatures are between 60 and 80 degrees at a collection site. Consequently, the time frame chosen was September and October of 1988. In this case a factor influencing the length of the planning was that the Agency staff involved also had to continue performing their usually assigned functions. This precluded conducting these pilot projects in the spring of 1988, but in theory weather conditions in April and May would usually be appropriate for collections.

The procurement document which was developed (known as an RFP or Request for Proposal) was designed to be easily adaptable so that it could be used in a generic way in future projects. This RFP is lengthy (54 pages) because it establishes in great detail how the collection site activities and disposal operations are to be conducted. The Agency's concerns are that hastily organized collections can result in significant safety hazards for both participants and workers. Additionally, the long-term liability for the eventual disposal of these wastes is not to be minimized. Consequently, the Agency's staff concentrated on development of a very explicit description of these operations in the RFP, both for the contractors' direction and to facilitate future use of the document as a model for other projects.

An early decision that had to be made was what materials to accept and what to advertise as not to be brought to the collection sites. The options were whether to accept waste oils, latex paints, radioactive smoke detectors, other radioactives, auto batteries, explosives, and ammunition as well as the recognized hazardous chemical wastes such as pesticides, oil based paints, caustic cleaners, solvents, antifreeze, etc. The Agency decided that waste explosives, ammunition and radioactives were too dangerous to transport and to gather at a collection site. Citizens were directed to notify local authorities if these substances needed disposal and arrangements were made for appropriate experts from state agencies to respond if requested or to provide appropriate advice. No such requests were received to our knowledge. Radioactive smoke detectors don't pose an exposure hazard and can be disposed of with general trash. Auto batteries were beyond the scope of products usually handled by the anticipated contractors; however, they were accepted at the collection sites for transport to local recyclers or participants were directed to the local recyclers who often pay a nominal sum for used batteries. The Agency decided to accept waste oils and latex paints because many consumers can't distinguish these materials from more hazardous products and because these wastes were likely to consist of a large volume of the wastes submitted at a collection site.

Another, even more problematic type of waste had to be considered, one for which there is currently no commercial disposal capability available. This type of waste will be referred to as F027 waste in this report, that being the RCRA code designation which applies to this waste class. It consists of waste containing the pesticides pentachlorophenol, 2,4,5-trichlorophenol and silvex as well as their derivatives. These compounds have been found to form chlorinated dioxins when incinerated and USEPA has consequently banned their incineration (landfill disposal was previously banned) except at facilities having special certification by the USEPA administrator. To date, no such commercially available facilities have been designated. This situation presents a dilemma for planners. If these materials are accepted at a collection site, their storage must be provided for until disposal capacity becomes available. On the other hand, the option of refusing to accept these wastes during a collection solves the storage problem for the sponsors but leaves these very toxic materials in the hands of the consumer, which is contrary to the basic purpose of these projects.

The Agency chose to accept these F027 wastes during the pilot program and prevailed on the cooperating municipalities to store them until commercial capacity becomes available. IEPA made a commitment to effect disposal at that time. The Agency is of the opinion that these materials are less of a health and environmental risk if they are stored under known conditions where local response agencies are aware of their presence, hazards, and the correct response to releases than if the materials continue to be stored by homeowners where responders may be unwittingly exposed in an emergency because they are unaware of their presence. Moreover, having been made aware of the F027 waste hazards, homeowners may become fearful and dispose of these wastes inappropriately because of the immediate lack of appropriate alternatives.

A similar safety emphasis was placed on the design of the collection site operations. As participants arrived in vehicles at a site they were directed to wait in a line starting at the greeting/control point. At each site this was laid out such that the off-street portion of the line had a capacity of at least ten cars. At or before the greeting/control point, participants were greeted by Agency staff or local volunteers, given educational handouts provided by the Agency and asked to participate in a simple written survey. The handouts and survey were introduced at this point to give participants time to complete the survey while they waited in line. At the greeting/control point completed surveys were collected from the participants and they were directed to either of two unloading areas immediately adjacent to the contractor's sorting/packing tent. There participants were directed to stay in their vehicles while the contractor's employees did all the unloading. When finished the participants were directed to a designated exit. Traffic flow was controlled by traffic cones delineating lanes. The basic intent of these arrangements was to keep participants as far away from potential exposure situations as practically possible. The approach was successful in that no accidents or exposures occurred during the pilot program.

The contractor was deployed at the collection site as described above. After removing wastes from the participants' vehicles, the contractor's technicians doing the unloading placed the containers in large tubs on a sorting table. There, the contractor's chemists sorted the incoming

wastes into hazard classes for shipping and disposal. These hazard classes were either directly lab packed into shipping containers (55 gallon drums) with sorbant cushioning or were placed in tubs or buckets in designated areas for each hazard class and packaged later. Certain solvents and the waste oils were emptied from their original containers into bulk drums, in order to reduce disposal costs. Latex paints were similarly bulked. Oil based paints were lab packed for incineration because of the potential for toxic heavy metals to remain in the paint sludge left in the cans if they had been bulked. Emptied containers were disposed in a dumpster as trash along with any packaging and boxes used by the homeowners to hold the waste containers during transport. Contractor personnel adhered to a detailed site safety plan developed by the Agency. Extensive emergency response, personnel respiratory protection and first aid equipment was immediately at hand. All persons handling chemicals were required to wear chemical protective coveralls, eye protection, and non-woven gloves. Those personnel involved with bulking the liquids wore full face air purifying respirators (gas masks), a rubber apron and two sets of gloves. This attire is standard for anyone working occupationally with toxic chemicals. A tent canopy was also specified to cover most of the contractor operations, both to protect the wastes in case of inclement weather and to keep the workers from getting heat stroke (a very real possibility when dressed in protective gear that of necessity does not allow perspiration to evaporate and cool the body).

At the end of each one-day collection project, the contractor was obliged to finish packing the waste, and put it on trucks before leaving the site. The trucks containing the wastes had to be moved off site by the end of the following day. Only the F027 wastes remained, and they were transported to a safe storage location designated by the cooperating municipality.

Publicity for these projects was coordinated by the Agency's Public Information staff. As noted above, differing levels of effort in this area were purposefully applied. Research of similar projects conducted elsewhere had not produced much guidance with regard to the effectiveness of differing levels of public information. Thus, this seemed to be an area that the pilot projects might be designed to further clarify. Even so, a strictly controlled scientific experiment was not practical. A minimum level of outreach was conducted by the Agency on each project. Because Mt. Carmel had no sponsoring organization that had originated the project idea, there were no local supporters of that project. Moreover, only the daily newspaper and local radio covered the pre-event publicity along with a few printed notices posted by the Agency at offices and businesses around town. The media coverage in Quincy was greater, with TV and radio airing the pre-project news releases as well as the print media. In Homewood the Junior Womens Club was a very active supporter for the project in their area. They spent over \$4100 and many hours of volunteer work to publicize that project. For the Homewood project, radio and TV coverage was not substantial, however, they sent a direct mailing to every area resident, had local bank and utility bills stuffed with reminders, sent letters to local organizations, sent reminders home with students, distributed 200 posters and had a banner placed over a main street. An overall assessment of publicity efforts would be to rate Mt. Carmel's as low, Quincy's as moderate and Homewood's as high.

RESULTS OF PILOT PROJECTS

In an effort to present as much information in the least confusing manner possible, a tabular format is being used to present the details. Table 2 illustrates the major planning and implementation tasks and their actual completion dates.

Table 2
PILOT PROJECTS TIMELINE

<u>Task</u>	<u>Start - Finish Date</u>
Drafted Safety Plan	January - April 1988
Drafted RFP	April - June 1988
Contacted Local Governments	May - June 1988
RFP Released	July 1988
RFP Response Due	August 1988
Pre-Project Publicity	August - October 1988
Bid Evaluation	September 1988
Contract Award	September 1988
HHW On-Site Collections	Sept. 22, Oct. 1, and Oct. 22, 1988
Waste Disposal	November 1988

Specific situational details of each pilot project are presented in Table 3.

Table 3
PILOT PROJECT DESCRIPTIVE DATA

September 22, 1988

Sponsor: City of Quincy
Contact: Mayor Verne Hagstrom
Don Kulak, Assistant City Engineer
217-228-4530
Coverage Area: Effectively Quincy and rural Adams County
Weather: Sunny and humid with temperatures in the high 70's
to low 80's.
Location: The City of Quincy Public Works Garage parking lot
located near the central business district on a three
lane, one-way street.

October 1, 1988

Sponsor: City of Mt. Carmel
Contact: Mayor Rudy Witsman
Mark Bader, City Administrative Assistant
618-262-4822
Coverage Area: Effectively Mt. Carmel and rural Wabash and Edwards
Counties.
Weather: Rain during the morning with temperatures in the 60's.
Location: An undeveloped cul-de-sac in an industrial park on
the edge of town. Served by a major highway.

October 22, 1988

Sponsors: The Homewood Junior Womans Club, Village of Homewood,
Village of Flossmoor, Village of Glenwood, Village
of Hazel Crest
Contacts: Diane Levy and Sharon White of the Homewood Junior
Womans Club at 312-799-9533 and 312-798-4446
respectively as well as Ray Presnak of the Homewood
Fire Department at 312-798-2123
Coverage Area: Pre-event publicity stressed it was only for residents
of the participating villages. (The villages put
up \$2000 each to help cover costs.) No participants
were turned away, but only four out of the total of
351 were from outside the targetted coverage area.
Weather: Sunny but chilly with temperatures in the 50's to
low 60's.
Location: The Village of Homewood Municipal Garage parking lot.
The site was roomy but the roadway serving it was
a two lane, two-way street. Traffic problems were
anticipated but did not occur.

A count was kept of the hourly frequency of participant arrival. As the data in Table 4 show, no clear pattern is discernible. This was an advantage in that waiting times for participants were relatively short and traffic problems didn't occur off-site. All projects accepted wastes only from 8 a.m. to 3 p.m.

Table 4
HOURLY ARRIVAL FREQUENCY OF PARTICIPANTS

<u>Time</u>	<u>Quincy</u>	<u>Mt. Carmel</u>	<u>Homewood</u>
8 a.m. - 9 a.m.	54	8	29
9 a.m. - 10 a.m.	53	5	59
10 a.m. - 11 a.m.	40	9	48
11 a.m. - 12 p.m.	38	9	67
12 p.m. - 1 p.m.	25	3	49
1 p.m. - 2 p.m.	23	6	48
2 p.m. - 3 p.m.	<u>40</u>	<u>5</u>	<u>51</u>
TOTAL	273	45	351

The types and respective amounts of wastes collected at each project are presented in Table 5. These are further categorized by the disposition, of each waste type.

Table 5
WASTES COLLECTED PER SITE AND THEIR DISPOSITION

<u>Disposal</u>	<u>Waste Type</u>	<u>Number of Drums</u>		
		<u>Quincy</u>	<u>Mt. Carmel</u>	<u>Homewood</u>
Treatment	Corrosives	2	2	0
Fuel Recovery	Flammable Solvents	8	1	4
Incinerated	Flammable Solvents	3	1	4
	Organic Poisons & Pesticides	7	2	7
	Corrosives	1	1	3
	Oil-based Paint	47	10	40
	Haz. Waste Liquid	8	2	10
	Aerosol Containers	3	2	7
	Oxidizers	3	1	2
Landfilled	Inorganic Poison Solids	2	1	0
	Haz. Waste Liquid	2	0	0
	Haz. Waste Solid	<u>0</u>	<u>3</u>	<u>26</u>
<u>TOTAL DRUMS</u>		86	26	103

Project expenses are summarized in Table 6. The direct cost of the contractor is quantifiable, the indirect administrative expenses to the IEPA are estimated. The cost to local governments for support and the value of volunteer assistance for traffic control and greeting participants is not quantified.

Table 6
SUMMARY OF PILOT PROJECT COSTS

QUINCY

Mobilization of contractor	\$3,395
Disposal of wastes	\$42,546
IEPA on-scene coordination	\$2,378
SUB-TOTAL	<u>\$45,259</u>

MT. CARMEL

Mobilization of contractor	\$8,275
Disposal of wastes	\$12,195
IEPA on-scene coordination	\$1,617
SUB-TOTAL	<u>\$22,087</u>

HOMEWOOD

Mobilization of contractor	\$5,915
Disposal of wastes	\$46,595
IEPA on-scene coordination	\$1,718
* Contribution of villages of \$8000 minus \$4,175 promotional expenses by Homewood Junior Womens Club	<u>(\$3,825)</u>
SUB-TOTAL	<u>\$50,403</u>

PROGRAM MANAGEMENT

General Management	\$7,568
Total Direct Costs of Contractor	<u>\$119,721</u>
Total IEPA Administrative Costs	<u>\$13,281</u>

TOTAL COSTS	<u>\$133,002</u>
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More sense of this raw data can be made by comparing the calculated normalized costs presented in Table 7. The average amount of wastes brought by participants varied between projects by a factor of two. This was reflected in the cost per participant. The cost per pound also varied by site as it reflects the variation in mobilization costs. Travel and per diem for the contractor was minimal in Homewood as it was based nearby in Alsip. Travel to Quincy was also less than to Mt. Carmel, but both required overnight stays for the contractor's staff.

Table 7
NORMALIZED PROJECT COSTS
(direct cost of collection and disposal only)

<u>Project</u>	<u>Waste per Participant*</u> (lbs.)	<u>Cost per Pound Waste</u>	<u>Cost Per Participant</u>
Quincy	126	\$1.34	\$168
Mt. Carmel	231	\$1.97	\$455
Homewood	117	\$1.27	\$150
<hr style="border-top: 1px dashed black;"/>			
AVERAGE	129	\$1.38	\$178

* assuming an average of 400 pounds per drum collected

It must be realized that these normalized costs are simplifications since disposal costs for individual waste types and disposal methods vary considerably. However, they are useful in the aggregate to estimate costs for future projects. To calculate such estimates one would need to predict participation. Table 8 summarizes the participation rates for the project target areas.

Table 8
PARTICIPATION RATES

<u>Project</u>	<u>Target Households*</u>	<u>Participants</u>	<u>Households Participating*</u>
Quincy	16,000	273	1.7%
Mt. Carmel	4,000	45	1.1%
Homewood	20,000	351	1.8%

* Target households were calculated by assuming 2.5 persons per household divided into the target population data of Table 1.

The USEPA in "A Survey of Household Hazardous Wastes and Related Collection Programs" (1986) reports that few of the 200 programs they reviewed had participation rates greater than one percent of households and several had less than 0.2 percent. Considering the large variance in the degree of promotional efforts expended for the projects, the narrow range of the participation rates suggests that there is a limit to the effects that increases in publicity efforts can achieve in terms of increased participation.

PROJECT SURVEY RESULTS

Participants in the pilot projects were requested to complete a survey form as they waited for their vehicles to be unloaded. The questions asked were intended to gain some insight into their attitudes regarding household hazardous waste as well as their input on how future collection projects should be designed.

The first question was asked to determine what communication efforts were most successful in making participants aware of the collection. The responses differed widely by project location as shown in Table 9. This was no surprise since the intensity and target media of communication differed widely among the projects. Overall, it looks like the print media was most effective, possibly because it better conveys more complex information. It also suggests that pre-event coverage by radio and TV is not extensive unless the target area of the project is a major portion of the local TV or radio media market.

Table 9

Survey Question: How did you first become aware of this household chemical collection?

<u>Answer</u>	<u>Quincy</u>	<u>Mt. Carmel</u>	<u>Homewood</u>
Newspaper	37%	65%	30%
Radio	36%	18%	0%
Television	21%	0%	0%
Received letter	N/A	N/A	43%
Bill insert	N/A	N/A	9%
Posters	N/A	0%	4%
Word of mouth	3%	11%	5%

The second question was asked to determine how long participants had waited for an appropriate means of HHW disposal to appear. As the statistics in Table 10 indicate, many had stored these wastes for decades. This suggests that repetitions of such projects on a periodic basis might result in progressively lower amounts of waste being collected per participant. However, since participants were at most only two percent of the targeted households this projected decrease might well be negated by increased overall participation which draws in new participants with years of accumulated waste.

Table 10

Survey Question: How many years of accumulation does the material you brought today represent?

<u>Project</u>	<u>Average</u>	<u>Range</u>
Quincy	9.5 years	1.5 months to 50 years
Mt. Carmel	10.0 years	2 months to 40 years
Homewood	7.8 years	1 month to 60 years

Homewood Clean-Sweep

Household Hazardous Waste Collection
October 22, 1988

PARTICIPANT SURVEY

How did you first become aware of this Household chemical collection?

- | | |
|---|-------------------------------------|
| <input type="checkbox"/> Received a letter | <input type="checkbox"/> Newspaper |
| <input type="checkbox"/> Word of mouth | <input type="checkbox"/> Radio |
| <input type="checkbox"/> Insert in bill or bank statement | <input type="checkbox"/> Television |
| <input type="checkbox"/> Posters | <input type="checkbox"/> Other |

How many years of accumulation does the material you brought today represent?

Did you attempt to find someone who could use your wastes?

- | | |
|--|---------------------------------------|
| <input type="checkbox"/> Did try, no luck | <input type="checkbox"/> Not reusable |
| <input type="checkbox"/> Didn't try, probably still usable | |

Circle the frequency with which you would participate in similar collections if offered in the future.

Monthly Every 6 Months Yearly Every 2 Years Every 5 Years

Circle the most convenient time for you in each category to help us plan future collections.

1. Month -- Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

2. Day of Week -- Weekday Weekend

3. Time of Day -- 8:00 am - 5:00 pm Evenings

If this service was offered commercially how much would you be willing to pay to assure environmentally sound disposal?

\$0/pound \$1/pound \$5/pound \$10/pound \$15/pound

(assume 10 pounds/gallon)

COMPLETING THIS SURVEY IS VOLUNTARY

THANKS FOR YOUR ASSISTANCE

Data in Table 11 tabulate responses to the next question, which was asked to determine if participants had made efforts to appropriately use up the materials or find someone else who could. Admittedly the available answer checkoffs didn't cover every possible response. However, the consistency of responses between projects was high, indicating that more educational efforts need to be expended in this area to promote HHW minimization by source reduction.

Table 11

Survey Question: Did you attempt to find someone who could use your wastes?

<u>Answer</u>	<u>Quincy</u>	<u>Mt. Carmel</u>	<u>Homewood</u>
Didn't try	43%	63%	43%
Not reusable	42%	32%	45%
Did try, no luck	15%	5%	12%

The next series of questions asked about the most convenient timing for holding future collections. The frequency data shown in Table 12 heavily favor annual collections. Not surprisingly, Tables 13 through 15 show that replies heavily favored the months, time of day, and day of week on which the pilot projects were conducted. Such sample bias is to be expected. It does appear that the spring months of April, May and June would be more acceptable than winter or summer, probably because spring housecleaning results in HHW generation, accumulation and discovery.

Table 12

Survey Question: With what frequency would you participate in similar collections if offered in the future?

<u>Frequency</u>	<u>Quincy</u>	<u>Mt. Carmel</u>	<u>Homewood</u>
Monthly	2%	5%	5%
Every 6 Months	22%	16%	18%
Yearly	49%	67%	55%
Every 2 Years	18%	7%	15%
Every 5 Years	9%	---	7%

Table 13

Survey Question: What are the most convenient months for future collections?

<u>Month</u>	<u>Quincy</u>	<u>Mt. Carmel</u>	<u>Homewood</u>
September	28%	33%	14%
October	12%	30%	27%
June	10%	12%	7%
May	10%	9%	8%
April	9%	9%	10%
August	8%	3%	6%
July	7%	3%	6%
March	4%	---	5%
January	3%	---	4%
November	3%	---	5%
December	3%	---	4%
February	3%	---	4%

Table 14

Survey Question: Would weekday or weekend collection be more convenient?

<u>Days</u>	<u>Quincy</u>	<u>Mt. Carmel</u>	<u>Homewood</u>
Weekend	79%	89%	82%
Weekday	21%	11%	18%

Table 15

Survey Question: Would business hours or evenings be more convenient?

<u>Time</u>	<u>Quincy</u>	<u>Mt. Carmel</u>	<u>Homewood</u>
8 a.m. - 5 p.m.	88%	97%	89%
Evenings	12%	3%	11%

The last survey question explored reactions to potentially being charged a fee for this service. While a fifth of the participants wouldn't have been willing to pay anything, two thirds would have paid a dollar a pound. This finding is encouraging when compared to the data in Table 7 above which shows the average actual cost per pound to have been \$1.38 for these projects. Admittedly, participants probably weren't aware of the weight of their wastes, and also the available answer choices to the question were limited. However, in a qualitative sense these answers suggest that the public is generally receptive to the idea of paying what they might consider a reasonable direct fee for disposal of household hazardous waste.

Table 16

Survey Question: If this service was offered commercially how much would you be willing to pay to assure environmentally sound disposal? (assume 10 pounds/gallon)

<u>Dollars Per Pound</u>	<u>Quincy</u>	<u>Mt. Carmel</u>	<u>Homewood</u>
0	19%	25%	18%
1	63%	61%	64%
5	16%	14%	15%
10	2%	---	2%
15	---	---	1%

This survey was admittedly unscientific and biased. No comparison or control groups were used. Furthermore, the available choices of answers was not comprehensive and may have artificially categorized some participants' true opinions. Nevertheless, it provides some interesting insights into the attitudes of those who were participants.

FINDINGS

The feasibility of operating a household hazardous waste collection and disposal assistance program has been studied by the Agency. The study consisted of a literature review, direct contact with persons coordinating such collections in other states, observation of non-state supported collection in Illinois, and conducting pilot projects in three cities.

The Agency has found that the public is generally receptive to the availability of such disposal assistance. This was evidenced by the survey data showing that most participants had been waiting for such a disposal opportunity for over ten years. Participation rates seem low at 1% to 2% of households, but are probably as high as 10% to 20% considering data reported by DENR* that only about twenty percent of households they studied inappropriately disposed of some household hazardous wastes each year. This means that the target audience for such collections are only about 20% of all households at any given point in time.

A second finding of the Agency is that these collection projects can be organized to be operated in a safe and efficient manner. Using the model project design which the Agency developed to conduct the pilot projects, future collections can minimize the planning and procurement efforts necessary. During this study, the Agency concentrated on documenting the operating procedures of a collection into a request for proposal (RFP) and contract language that includes as many details of the collection operation as possible.

As anticipated, it was found that these projects are expensive. Costs ranged from \$22,087 to \$50,403 per project and primarily depended upon the amounts of wastes collected. Aside from the unit costs of disposal, each project had overhead costs for mobilization of the contractor to the collection site and for project administration. Based on the presumption that these collections could be made available to the entire population of the state at the costs and volumes incurred during the pilot projects, the annual operational costs would be in excess of \$17 million without allowing for administrative expenses. A less ambitious program would probably be more appropriate for the long term.

Another finding of the pilot projects was that the design of public information campaigns preceding such projects are critical to the participation rate, yet it appears that such efforts result in marginal returns after a certain point is reached. More research on effective communication strategies is needed.

An observation of Agency staff at the collections was that many participants were poor judges of what was and was not hazardous. Better education campaigns or some sort of pre-screening of wastes might help in reducing the average volume of waste brought by participants.

* "Participation in a Household Hazardous Waste Collection Drive and "Before" and "After" Public Knowledge and Disposal Practices: Champaign County", R. J. Liebert, Illinois Department of Energy and Natural Resources, (1988).

RECOMMENDATIONS

The Agency is of the opinion that household hazardous waste collection and disposal projects are beneficial and worthy of continued support. Specific legislative changes are probably necessary to clarify their legal status in Illinois. Funding assistance from the Solid Waste Management Fund also appears appropriate. Further research is suggested on the feasibility and effectiveness of continuous household hazardous waste collection centers associated with established recycling efforts on a regional basis.

Experience gained from the three pilot projects should be used to design a three year, full-scale collection program as follows:

1. Year One - Sept./Oct., 1989

- Conduct collections at five sites in the Chicago Metropolitan area and one site in Rockford.
- Use and evaluate at least three alternative marketing strategies for encouraging participation.

2. Year Two - Sept./Oct., 1990

- Conduct collections at seven sites across central Illinois.
- Use and evaluate at least three alternative marketing strategies for encouraging participation.

3. Year Three - Sept./Oct., 1991

- Conduct collections at seven sites across southern Illinois.
- Use and evaluate at least three alternative marketing strategies for encouraging participation.

4. Continuous Collection Pilot Project 1989 - 1991

- Establish one continuous collection pilot project site to assess the economic and operations feasibility of this manner of conducting the collection.
- Conduct a time-variable education and marketing campaign to encourage participation.

For each year, the total cost of the collection program should be managed so as to not exceed about \$500,000 in contractor and Agency expenses. The collection program should be reassessed at the end of this three-year period to determine the overall cost-effectiveness of this approach.

JO'B/psf

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